

Illinois-American Water Company
Pekin District
Comprehensive Planning Study-Appendix A
Water Quality Regulations

2.4.1 Water Quality Regulations

Numerous regulations have been promulgated, and additional regulations have been proposed by USEPA and state regulatory agencies. These regulations will impact both the treatment process and operation of Water Company facilities in the future. In particular, the Safe Drinking Water Act Amendments of 1996 were passed by Congress to reaffirm prior rules, establish new requirements for selecting contaminants to be regulated, allow for the analysis of health risk reduction, costs and benefits, and permit competing risks to be weighed.

In the past several years, the USEPA has promulgated twelve water quality rules within the Safe Drinking Water Act. These include the Surface Water Treatment Rule (SWTR), the Total Coliform Rule, Phase I - Volatile Organic Contaminant Rule, Phase II - Synthetic Organic Chemicals and Inorganic Chemicals Rule, Lead and Copper Rule, the Phase V Synthetic Organic Chemicals and Inorganic Chemicals Rule, the Disinfectants/Disinfection Byproducts (D/DBP) Rule, the Interim Enhanced Surface Water Treatment Rule (IESWTR), the Unregulated Contaminants Monitoring Rule, the Radionuclides Rule, the Filter Backwash Recycling Rule, and the Arsenic Rule.

Two major regulations, originally proposed in 1994, were finalized in 1998. These were the Interim Enhanced Surface Water Treatment Rule (IESWTR), and the Stage 1 Disinfectant/Disinfection By-Product Rule (D/DBP). As part of the IESWTR, the turbidity standard is lowered to 0.3 NTU from the current 0.5 NTU in 95% of samples, effective January 1, 2002. Maximum contaminant levels (MCLs) for disinfection by-products are modified in the D/DBP rule. The rules are explained in more detail in the following subsections, and a summary of the time frame for proposal, promulgation and enforcement of the expected future regulations is shown in the following Table A-1:

Illinois-American Water Company
Pekin District
Comprehensive Planning Study-Appendix A
Water Quality Regulations

Table A-1
Target Dates for Future Water Quality Regulations per the 1996 SDWA ⁽¹⁾

Rule	Proposal Date	Promulgation Date	Effective Date ⁽²⁾
Interim ESWTR	November 1997	December 1998	January 2002
D/DBP Stage 1	November 1997	December 1998	January 2002
Radon	November 1999	October 2003	October 2006
Ground Water Rule	May 2000	June 2003	June 2006
Arsenic	June 2000	January 2001	January 2004/2006 ⁽³⁾
Long Term 1 ESWTR	April 2000	January 2002	January 2005
Filter Backwash	April 2000	June 2001	June 2004/2006 ⁽⁴⁾
Radionuclides	April 2000	December 2000	December 2003
D/DBP Stage 2	February 2003	February 2004	February 2007 and 2010 (see details)
Long Term 2 ESWTR	February 2003	February 2004	February 2007 and 2010 (see details)

Notes:

- (1) Target dates for systems serving more than 10,000 persons (large systems); except LT1ESWTR that applies to systems serving less than 10,000 persons (small systems).
- (2) Compliance (effective) dates are normally 3 years after promulgation date. Small systems and systems making major capital improvements may be allowed two additional years to achieve compliance, depending on the rule. The effective dates have not been finalized for rules that have not been promulgated, but are presented for planning purposes only. The rule-making process could result in later dates.
- (3) Year 2004 for new sources, and 2006 for existing sources.
- (4) Year 2004 for recycle requirements, and 2006 for capital improvements.

The impact of these rules on Water Company production facilities has been assessed based on current information in the draft or final regulations. The implementation schedule and the extent of improvements associated with these regulations are subject to change as the rule-making process continues. Promulgation of rules is anticipated at various dates through 2004.

Illinois-American Water Company
Pekin District
Comprehensive Planning Study-Appendix A
Water Quality Regulations

Compliance dates are estimated to be between 2002 and 2010. Section 1412(b)(10) of the SDWA requires that drinking water rules become effective three years after promulgation. In some cases, the effective date may be extended to allow for construction of major capital projects needed to comply with the regulation. The scope and schedule of the recommended projects were developed to be flexible enough to respond to changes in these rules. The following pages present a brief discussion on recent and proposed rules.

Safe Drinking Water Act (SDWA)

The Safe Drinking Water Act Amendments of 1996 reaffirmed the National Primary and Secondary Drinking Water Regulations, Maximum Contaminant Levels (MCLs), Maximum Contaminant Level Goals (MCLGs) and secondary maximum contaminant levels. The 1996 SDWA has changed the basis for setting drinking water standards, emphasizing comprehensive public health protection through risk-based standard setting, increased funding, reliance on best available science, prevention tools and programs, strengthened enforcement authority for USEPA, and public participation in drinking water issues.

Lead and Copper Rule

The Lead and Copper Rule, promulgated in June 1991, involves a treatment technique requirement consisting of corrosion control, source water treatment, public education, and in some instances, lead service line removal. The bases for compliance are the results of tap water monitoring and optimization of corrosion control treatment. Initial tap monitoring results are used to direct the utility to either perform optimization studies, or if lead and copper levels are below the action levels, the utility continues its monitoring program at a reduced frequency.

Surface Water Treatment Rule (SWTR)

The Federal SWTR was promulgated in June 1989 and became effective June 30, 1993. Under the SWTR, the USEPA requires all surface waters to be filtered and disinfected. The filtration and disinfection requirements are intended to protect against potential adverse health effects from exposure to pathogenic organisms. Criteria are also specified for utilities interested in avoiding filtration.

The SWTR specifies that all public water systems using any surface water source must treat the source(s) to achieve at least 99.9 percent (3-log) removal/inactivation of *Giardia lamblia* cysts and at least 99.99 percent (4-log) removal/inactivation of viruses. A system is judged in compliance with the first part of the rule specifying 2.5-log removal of *Giardia* and 2.0-log removal of viruses if it meets the filtration performance requirements of the rule. Adequate disinfection is anticipated to provide an additional 0.5-log inactivation of *Giardia* and 2-log inactivation of viruses. The filtration performance requirement states that systems utilizing either conventional treatment or direct filtration must produce filtered water with a turbidity level less than or equal to 0.5 NTU in 95 percent of the samples taken monthly. At no time are turbidity levels in the plant effluent to exceed 5 NTU.

Illinois-American Water Company
Pekin District
Comprehensive Planning Study-Appendix A
Water Quality Regulations

The AWWSC standard for new clearwell design is based on a 0.5-log inactivation of *Giardia*. Clearwell size is calculated at maximum flow rates, current effluent chlorine residual and pH, and a temperature of 0.5°C in a half-full clearwell.

The second component of the Federal SWTR rule states that the disinfectant residual in water entering the distribution system cannot be less than 0.2 mg/L for more than 4 hours. Further, the disinfectant residual in the distribution system cannot be undetectable in more than 5 percent of samples in a month for any two consecutive months. Systems may measure Heterotrophic Plate Count (HPC) bacterial levels instead of disinfectant residual. Sites with HPC densities less than or equal to 500 colony-forming units per milliliter are considered equivalent to sites with detectable residuals for the purpose of determining compliance (USEPA 1989).

The USEPA Guidance Document recommends that a well-operated plant also includes loss-of-head and rate-of-flow monitoring, continuous monitoring turbidimeters located on the raw water, settled water, individual filter effluent and plant effluent, and continuous chlorine residual monitoring on the plant effluent.

Interim and Long Term Enhanced Surface Water Treatment Rules

The Interim Enhanced Surface Water Treatment Rule (IESWTR) was promulgated in December 1998, and imposes additional requirements on systems that serve 10,000 or more persons and utilize surface water or groundwater under the direct influence of surface water. The compliance date for the IESWTR is January 1, 2002. At that time the more stringent requirements of the IESWTR will supersede the SWTR requirements.

Under the IESWTR, the turbidity standard will be lowered to 0.3 NTU in 95% of samples with a not-to-exceed level of 1 NTU. In addition, individual filter monitoring will be required at 15-minute intervals. A 2-log removal of *Cryptosporidium* is also required, and this level of removal is assumed to be achieved if filter performance meets the 0.3 NTU turbidity standard. The IESWTR also requires a self-assessment for any individual filter exceeding the 1.0 NTU proposed standard, and a Comprehensive Performance Evaluation by the State if turbidity levels for an individual filter exceed 2.0 NTU for two consecutive 15-minute intervals. Other criteria in the IESWTR include disinfection profiling and benchmarking as a monitoring and self-assessment tool.

The Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) was promulgated in January 2002 with compliance required by January 2005, and requirements will be put into place for surface water and Ground Water Under Direct Influence (GWUDI) systems that serve fewer than 10,000 population, just as the IESWTR requires for larger plants. The Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) is scheduled to be proposed February 2003 and finalized February 2004, with compliance phased in from 2007 through 2010. The LT2ESWTR will require monitoring source water for *Cryptosporidium*, and depending on the concentration of the microorganism, will require additional treatment from a toolbox of options.

Illinois-American Water Company
Pekin District
Comprehensive Planning Study-Appendix A
Water Quality Regulations

Trihalomethane (THM) Rule & Disinfection/Disinfection By-Product Rule

In 1979, the USEPA established a MCL of 100 µg/L for the total trihalomethane concentration (THM) in drinking water. The MCL is applicable to all systems serving 10,000 or more persons that add a disinfectant in their treatment process. Regulated systems are required to monitor for THMs at quarterly intervals. Compliance is based upon a running average of four quarterly samplings. Quarterly monitoring for THMs and other disinfection by-products (DBPs) is performed via collection of samples in the distribution system remote from the source of supply.

In December 1998, the USEPA promulgated Stage 1 of the Disinfectants/Disinfection By-product (D/DBP) Rule, which has a compliance date of January 1, 2002. Stage 1 requirements specify the MCLGs and MCLs for various disinfection by-products, and the Maximum Residual Disinfectant Level Goals (MRDLG) and Maximum Residual Disinfectant Levels (MRDL) for various disinfectants. In addition, the Stage 1 D/DBP Rule specifies a treatment technique for removal of organic carbon by coagulation processes through the treatment plant.

In the future, a Stage 2 D/DBP Rule is expected to be proposed in February 2003, finalized in February 2004, and requiring phased-in compliance from 2007 through 2010. The principal elements of the Stage 1 D/DBP Rule are shown in Table A-2.

**Table A-2
Stage 1 D/DBP Rule - Maximum Levels**

Disinfectant	MRDLG (mg/L)	MRDL (mg/L)	Comment
Free chlorine	4.0	4.0	as Cl ₂
Chloramines (Total chlorine)	4.0	4.0	as Cl ₂
Chlorine dioxide	0.8	0.8	as ClO ₂
Contaminant	MCLG (mg/L)	MCL (mg/L)	Comment
Total trihalomethanes	0.0	0.08	
Total haloacetic acids (HAA ₅)	0.0	0.06	
Bromate	0.0	0.01	for systems with ozone
Chlorite	0.8	1.0	for systems with ClO ₂

Stage 1 of the proposed D/DBP rule calls for a reduction of TTHMs to a level at or below 80 µg/L, as calculated on a Running Annual Average (RAA). The Stage 2 proposal is expected to maintain the 80 µg/L MCL, but changes the compliance calculation to the Locational Running

Illinois-American Water Company
Pekin District
Comprehensive Planning Study-Appendix A
Water Quality Regulations

Annual Average (LRAA), which has the effect of making the MCL more stringent by increasing the weighting for the highest THM locations in the distribution system.

The Stage 1 D/DBP rule also specifies a 60 µg/L MCL for five haloacetic acids (HAA₅). The Stage 2 D/DBP is expected to maintain this MCL, but change the compliance determination to the LRAA, which will have the effect of making this MCL more stringent by weighting the highest HAA₅ locations in the distribution system.

The Stage 1 D/DBP rule also requires that all public water systems using chemical disinfection and conventional treatment must operate with enhanced coagulation for removal of DBP precursors if the Total Organic Carbon (TOC) concentration prior to the first application of continuous disinfection exceeds 2.0 mg/L. If the specific ultraviolet absorbance (SUVA) of the raw or finished water is less than 2.0 mg/L, enhanced coagulation will not be required. The removal criteria, shown in the following Table A-3, are based on TOC and alkalinity concentrations.

Table A-3
Required Percent Removal of Total Organic Carbon under
1998 Stage 1 Enhanced Coagulation Performance Criteria

Total Organic Carbon (mg/L)	Alkalinity		
	0-60 mg/L	60-120 mg/L	>120 mg/L
less than 2.0 mg/L	no action	no action	no action
2.0 to <4.0 mg/L	35	25	15
4.0 to <8.0 mg/L	45	35	25
greater than 8.0 mg/L	50	40	30

Other Water Quality Regulations

- **Sulfate** - Currently, there is a secondary MCL of 250 mg/L for sulfate due to taste and odor. In June 2003 EPA made a preliminary determination not to regulate sulfate because the health effects are of short duration and occur at concentrations above the taste threshold. EPA expects to publish the final determination in late 2002, and would issue guidance to communities exposed to high sulfate concentrations
- **Radon** - The 1991 proposed standard for radon was withdrawn under the 1996 SDWA Amendments. Under the new SDWA Amendments, the USEPA prepared a risk assessment study for radon in drinking water using the best available science. In addition, USEPA directed an assessment of the health risk reduction benefits that are associated with reducing radon concentrations in indoor air. The USEPA published a health risk reduction and cost analysis in February 1999, for exposure to radon in drinking water and air. This included a discussion on the costs and benefits of multimedia mitigation programs. The MCLG and MCL for radon were proposed in

Illinois-American Water Company
Pekin District
Comprehensive Planning Study-Appendix A
Water Quality Regulations

November 1999 at 0 pCi/L and 300 pCi/L, respectively. An alternative MCL was proposed at 4,000 pCi/L with a Multimedia Mitigation program (MMM) to address radon risks in indoor air. The State or Community Water System (serving over 10,000 persons) can develop a MMM program. Most CWS serving 10,000 or less are expected meet the AMCL and to participate in a State MMM. The USEPA is strongly encouraging States to take full advantage of the flexibility and risk reduction opportunities in the MMM program. The USEPA fact sheet on Radon states, "It is more cost-effective to reduce risk from radon exposure from indoor air, than from drinking water". Radon is generally not found in surface water at levels of concern, but is present at high levels in some groundwater sources. The Rule is expected to be promulgated in October 2003. Various effective dates apply, depending on a State's choice of the MCL or AMCL.

- **Filter Backwash Rule** - A new standard was proposed with the LT1ESWTR in April 2000 and was promulgated in June 2001. This rule defines the need to treat recycle streams from spent filter backwash, thickener supernatant, or liquids from dewatering processes. This rule establishes a Treatment Technique of returning the above major waste streams to a location such that all coagulation, flocculation, sedimentation and filtration processes are employed for the recycled flows, unless the State specifies an alternative location.
- **Arsenic** - The current MCL for arsenic is 50 µg/L (0.05 mg/L). In January 2001 the USEPA promulgated an 80% reduction in the MCL to 10 µg/L based on new health data. Compliance with the new MCL will be required in January 2004 for new sources and January 2006 for existing sources.
- **Ground Water Rule (GWR)** - The USEPA proposed the Ground Water Rule in May 2000, and the final rule is expected to be promulgated in June 2003. The rule establishes multiple barriers to protect against bacteria and viruses in drinking water from ground water sources and will establish a targeted strategy to identify ground water systems at high risk for fecal contamination. This rule will require State Agencies to perform system sanitary surveys on all ground water systems every 3 years and identify significant deficiencies. Groundwater systems which do not provide 4-log virus inactivation/removal must perform a Hydrogeologic Sensitivity Assessment (HSA). Ground water systems that do not meet the 4-log criteria and are classified as sensitive under the HSA will be required to monitor monthly for fecal indicators. The proposed GWR also specifies corrective action to be taken for ground water systems that have a significant deficiency or have detected a fecal indicator in their source water. Corrective action includes eliminating the contamination sources, correcting the significant deficiency, providing an alternative source of water, or installing a treatment process which reliably achieves 4-log removal or inactivation of viruses.